Geomagnetism and Aeronomy 2001 vol.41 N6, pages 790-798

The spectra of long-period variations in the semidiurnal tide and predominant wind at altitudes of the upper mesosphere and lower thermosphere

Sidorov V.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

The altitude structures of the spectrum of long-period (diurnal) variations in the tidal motions and predominant wind and of the quasi-two-day wave disturbances on time scales of two to 40 days have been determined based on data of the new cycle of radiometeor wind observations and altitude measurements in the range 80-105 km, performed in Kazan (56° N, 49° E) in 1998-1999 within the scope of the European collective program INTAS-96-1669. The seasonal regularities identified previously for the long data series (1986-1988) have been corroborated. The wave disturbance spectra of the semidiurnal tide amplitude are considerably different from those of the predominant wind. In winter, the semidiurnal tide modulation intensity increases with altitude. In summer, this increase is less pronounced. The dispersion values averaged in altitude are ~90 m2 s~2 in winter and 55-60 m2 s-2 in summer. The correlation between the semidiurnal tide and predominant wind depends on altitude, time, season, frequency band, and wind components. On the average, the correlation values are lower than 0.5. In summer, the correlation is lower than in winter. The coherence spectrum has a less pronounced periodic structure changing with altitude. In this case, coherence increases or decreases between 0.1 and 0.7. The obtained data indicate that the spectral structure of wave disturbances between 80 and 105 km is complex, and that they are important for determining the modulation mechanisms of wave disturbances and tidal modes by larger -scale motions.